Digital to Analog Converter

JBF Systems (aka Team Awesome) Inc.
Introduction

- 8-bit DAC
  - R/2R ‘ladder’ design
  - Simple Source Follower to Buffer Output
    - Similar architecture to Homework 3

- In this Presentation
  - Spice Simulation Results
  - Resistor Layout Floorplan
  - Completed Layouts
Basic Schematic

R2R Network Simulation
R2R Network Simulation
Amplifier Clipping
Varying Input Transistor Width
Varying Current Mirror
Full DAC – Acceptable Performance
There are 17 total resistors in our schematic:
- 10 of resistance 2R
- 7 of resistance 1R

We cannot common centroid 7 resistors R, when R is our unit resistance

Therefore, we will use a unit resistance of R/2. This leads to 54 total unit resistors, which will be arranged into 10 groups of 4 and 7 groups of two

What is the best way to arrange the groups of four unit resistors?
The checkerboard pattern on the left, or the paired pattern on the right?
Resistor Layout Patterns

- The paired pattern on the right is better because there are fewer long distance connections between resistors => easier wiring
- Also – when this pattern is combined with the groups of two resistors, it fills space very efficiently.
Resistor layout - Wiring

The pattern on the previous page can be easily wired.

- Metal 1 – All vertical connections
- Metal 2 – All horizontal connections
- Metal 3 – Route the input and output pins

- We need to ensure that there is enough spacing between the resistors so that all wiring can fit between resistors and be drc clean.

- The previous pattern requires a small total number of long interconnects, thus, we will not need to leave large spaces between the resistors for wiring.
Resistor Layout
Amplifier Layout
Complete Layout
It’s Clean!
What's Next?

- Beach Trip!
- Graduation!
- Getting Paid!